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NEW YORK, SATURDAY, OCT. 3, 1925

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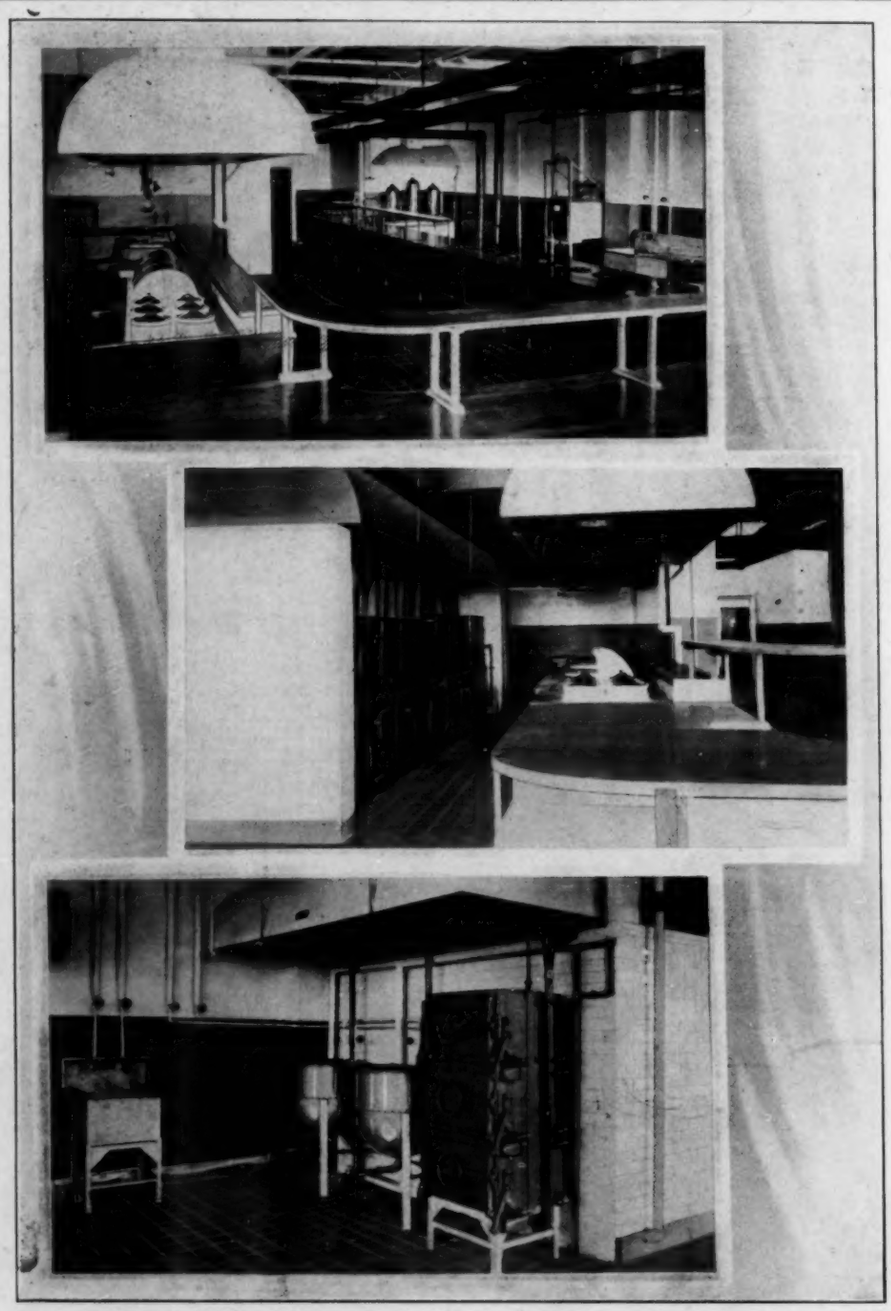

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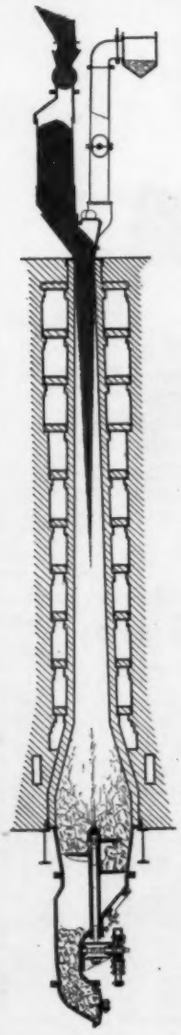

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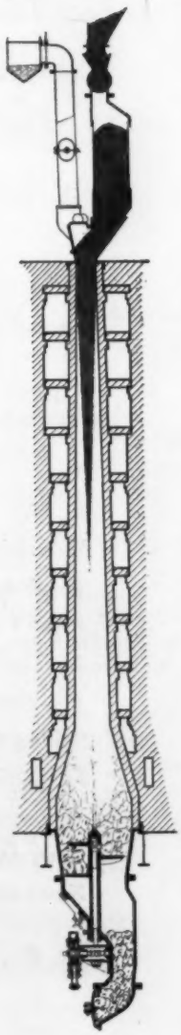

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American Gas Journal

SIXTY-SEVENTH YEAR

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Industrial Gas in Baltimore Industries

Many applications of interest are described

Charles C. Krausse

Superintendent of Fuel Sales, Consolidated Gas, Electric Light & Power Co. of Baltimore

THE importance of this development is manifest by the volume of gas used in 1924. The industrial commercial business represented 25.2 per cent of the total gas sales by the Consolidated Gas, Electric Light & Power Company of Baltimore last year.

The steady growth during 1924 and the first six months of 1925 extended uniformly over practically all classes of industries served. In addition, there were many applications of gas to industrial heating operations, formerly performed by other fuels. The increase in the use of gas by the industrial customers in 1924 was 21 per cent over 1923 and the first six months of 1925 shows 24 per cent over the corresponding period of 1924.

Some Uses of Gas in Baltimore

The following are some of the classifications which show the diversified nature of the increased usage of gas:

Industry Application of Industrial Gas

Food Products:	
Bread	Wholesale baking
Cake	Baking
Ice cream cones	Baking
Coffee	Roasting
Hotels and restaurants	Heavy duty cooking
Clubs and institutions	Heavy duty cooking
Hospitals, etc.	Heavy duty cooking
Packers	Meat smoking
Potato chips	Boiling
Clothing	Gas pressing machines
Ceramic industry	Enameling, etc.
Cork specialties	Drying, etc.
Barrels and kegs	Drying and shaping
Foundries	Aluminum melting
Chemical plants	Treatment of lithopone
Furniture	Japanning and tempering
Moving picture supplies	Drying
Plumbing supplies	Lead melting
Newspaper	Stereotype melting and steam drying
Machine shops	Heating treatment of metals
Tin decorating	Heating lithographing ovens
Tin cans	Dross melting
Auto rebuilding	Preparation of surfaces for refinishing

Before going into details of some of the various applications of industrial gas, a few brief remarks pertaining to other fuels may be very appropriate at this time because if gas is the ideal fuel, which will ultimately displace other fuels, it must be definitely shown that gas is by far the most desirable fuel from the standpoint of its efficient application and utilization and that on a basis of these advantages it will prove to be by far more economical than the competitive fuels.

Efficient Utilization of Natural Resources Vitally Important to Our Industries

The analysis of this problem shows that it all centers on the use we make of the basic commodity, namely, Coal.

Fuel oil, which many people believe will be our ultimate fuel and which is at the present time being used in large quantities by our industries, cannot be seriously considered because its supply is far from being unlimited. The big oil companies are treating our oil supplies the same way we would expect to find several children all drinking soda with straws from the same glass—no one of them daring to stop for fear that there would be more for the other fellows. The result is that the oil market is flooded and we have periods of very low priced oil. Furthermore, the developments in the manufacture of gasoline have enabled gasoline to be re-

covered from crude oil up to 80 per cent, which means that more and more the fuel oil price will approach that of gasoline. I would not be surprised to find the price doubled in the course of a few years. Furthermore, fuel oil is utterly incapable of meeting the nation's fuel demands, so that we can depend on just one source of fuel, and that is coal, the supply of which is practically unlimited.

When Is Basic Fuel Efficiently Utilized?

If this is the case, what is the solution? Our basic fuel can be efficiently utilized when we—

First—Gasify all coal and recover its by-products.

Second—Efficiently apply the gas generated to our heating operations.

It is a well established fact that fuel in a gaseous form is in the ideal condition for ease of application, efficient combustion and effective heating. It is common knowledge that all solid and liquid fuels before going through the final stage of complete combustion must be gasified. Every fire box and every combustion chamber for either coal or oil is, in itself, a small gas machine, in which the many factors and conditions necessary to carry out the various stages of gasification make the entire operation complex, with a result that the transformation of heat energy from these fuels is inefficient, unclean and laden with many limitations.

Coal on the Grate

For example, coal on the grate must first go through the processes of volatilization, vaporization and gasification before final combustion can take place. Liquid fuel on leaving the burner must be atomized, vaporized and gasified before we have a really desirable fuel.

On the other hand, a gaseous fuel contains those combustible elements which will unite directly with the oxygen of the air in the development of heat energy. When a mixture of gaseous fuel and air is admitted into a furnace, no extra constructed combustion chamber is required, but the gaseous fuel can be localized directly at the place where the best energy is desired. The great advantage that gas has over other competitive fuels is largely due to its great flexibility in combustion.

Because of its high rate of flame propagation, more fuel can be burned and a far greater number of heat units can be developed in the furnace or combustion chamber of given size. This being the case, the capacity of a given furnace is greatly increased.

Gas More Efficient

Under actual operating conditions, gas has proven to be anywhere from 50 to 400 per cent more efficient in its application than solid fuels. A million B.t.u. of manufactured gas fuel will displace from 1,500,000 to 4,000,000 B.t.u. of coal, depending upon the nature of the particular heating operation. Results taken from actual operations with gas have proven to be anywhere from 20 to 100 per cent more efficient in utilization than liquid fuel. A million B.t.u. of gas will displace from 1,200,000 to 2,000,000 B.t.u. of fuel oil, the variation, of course, being due to the characteristic of different heating processes.

In the factory, the gas is distributed to the different furnaces through pipes and that is all there is to the transportation. No storage facilities are necessary, no coal conveyors, no oily distribution lines and no ash handling equipment.

In the home, the use of gas is truly a blessing. Every man that owns a home knows only too well the many disagreeable duties connected with the shoveling of coal and the removal of ashes. The housewife who formerly used the old fashioned coal stove knows of these difficulties, too.

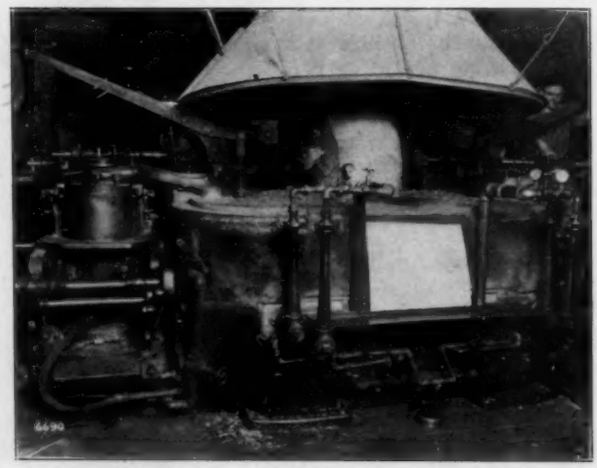
Today, the modern gas fired house heating furnace and the efficient gas range represent a great advancement in the elimination of those many disagreeable functions connected with the burning of solid fuel.

The fact that industries use natural gas where available in preference to oil or coal and that there are thousands of producer gas plants in operation today is convincing proof that industry is aware of the advantages of using a gaseous fuel.

Industrial Applications Increasing

The art of heat application in the industries is developing at a rapid rate. The greater the realization of the inefficiency and waste of present methods of the production and utilization of heat, the more so-called intangible advantages of gas become practical and actual.

The correct, efficient and effective application of fuel in the ceramic industries is the most important



Eight-Ton Stereotype Pot Heated by Gas

branch of factory operation in these industries. The melting of glass, the enameling on metal and the burning of pottery, all possess problems which are complicated and difficult. The selection of fuel,

(Continued on page 283)

The Feld Process

Obtaining pitch and tar oils, ammonia and sulphuretted hydrogen from coke oven gas

Dr. W. Funcke

(American gas men are acquainted from the Feld process for treating coke oven gas to obtain from it valuable by-products which are present as impurities in this gas. This process was developed in the Koenigsberg, Germany, gas works. The results of this process have been very promising. The same distinction is said to be possessed by the variation of this process, known as the Zeche Sterkrade, which has for its purpose the obtaining of pitch directly from gas.

In the article which follows, and which is translated in part from the original that appeared in Das Gas und Wasserfach, the fundamental bases of the process are discussed, the results obtained with it are described as well as the type of apparatus best suited for carrying out the Feld process.—Trans.)

THE processes that have been used up to the present time for the recovery and reworking of tar consist in cooling the tarry vapors, carried along by the gas, with resulting loss of the large masses of heat contained therein. The tar is then distilled with the consumption of further heat, whereat the vaporized ingredients of the tar, which are obtained at the various distillation temperatures, are again cooled and separated, so as to obtain condensates which are used as crude oil for various purposes while the pitch remains behind in the still.

Making a study of the different conditions which existed in the cooling of the coke oven gas, containing vapors of tar and water, Walter Feld developed the idea of recovering pitch and the various crude oils by using the heat, contained in the vapors obtained from the furnace, these products being recovered directly from the hot gases without the necessity of using extraneous sources of heat. The tar, which is, in general, a mixture of hydrocarbons of various boiling temperatures, is present in the vapor form in the hot distillation gases which leave the condensers. The various fractions of the tarry vapors are condensed in accordance with their boiling points. The temperature at which the condensation of one of the ingredients of the tarry fog takes place is determined by the dew point of the ingredient in the gas. The arrangement in the series of dew points of ingredients in the gas corresponds to that of the boiling points of these ingredients, so that the constituent of the gas which has the highest boiling temperature also has the highest dew point.

Distillation of Tar

When the tar is broken up by distillation, the individual constituents of the same arrange themselves into groups. These are differentiated from one another by limiting boiling temperatures. For example, pitch includes all the ingredients that boil at a temperature in excess of 350 degrees C. Steel works tar contains all the materials boiling above a temperature of 230 degrees C. Heavy oil boils between 230 and 270 degrees C., middle oil between 200 and 230 and light oil between 70 and 200 degrees C.

In order to separate these fractions directly from the gas and to obtain products which group themselves as indicated above, Feld subjected the gas to a fractional cooling process, wherein the end temperature reached in each stage of the cooling corresponded to the dew point of the highest boiling ingredient in the particular fraction. Feld accordingly determined the dew point of coke oven gas for different stages of cooling as follows:

Fraction Obtained	Boiling Temperature Degrees C.	Dew Point Degrees C
Pitch	over 350	160
Steel works tar	begins at 230	130
Heavy oil	230 to 270	100
Water	100	72
Liddle oil and naphthalene	20 to 230	30
Light oil	70 to 200	18

Washing the Gas

The separation of the individual constituents of the tarry matters in the gas was carried out coincidentally with auxiliary washing of the gas in stages. For this purpose Feld used in each stage a specially designed centrifugal washer, which was developed by him specially for washing purposes. As the cooling and washing agent the condensate itself from each of the first three stages is used. This condensate flows out in a constant stream from the washer and is sent back to the apparatus by means of a pump. After the wash liquor has become sufficiently saturated with the impurities removed from the gas, a definite amount of the liquid is removed from circulation, and the exact amount of removed liquid is replaced with the same amount of precipitated products that are obtained from the following stage in the washing. In this manner pitch, steel works tar, and heavy oil are obtained, while for the separation of the water vapor and the middle oil a more thorough cooling with water is required due to the low dew point of these ingredients in the gas. The separation of the middle oil from the water follows in regular order and is a very simple process because of the marked differ-

ence in specific weights. In the last stage of the process light oil is washed out of the coke oven gas with the aid of a benzol wash oil.

Operating Conditions

Inasmuch as the boiling point limits and therewith the commercial properties of the individual products obtained in the hot tar precipitation process are very intimately connected with the maintenance of definite temperatures, which must follow each other in definite order in the process, hence the absolute control of the operating temperatures is the sine qua non of the entire process. As the gas is itself a heat carrier, in order to attain accurate regulation of the temperature in the washers, the gas must be fed into the apparatus at a rate and in a quantity which are maintained as constant as possible. This hot tar precipitation process thus presupposes the greatest possible uniform production of gas. Inasmuch as the conditions in the average gas works are far from being of this character, as the load varies very greatly from day to day and from season to season, then it follows the Feld tar separation process, as outlined above, can hardly be employed in practical operations. Hence at this point this process will only be considered in so far as it has any connection with the polythionate process, which is described below.

What the Tar Separation Accomplishes

In the hot tar separation process Feld's principal purpose was to render the coke oven gas free from tar before it was cooled down to the dew point of water so that the ammonia and sulphuretted hydrogen may be obtained from the tar-freed gas, before the moisture in the latter had been precipitated. This enables the recovery of ammonia liquor of high concentration and avoids a loss of ammonia when the gas liquor is further treated. After the heavy oil has been washed at a temperature of approximately 100 degrees C. and still before the water in the gas has been separated as well as the middle oil, the ammonia and the sulphuretted hydrogen are recovered. This takes place at a temperature of approximately 80 degrees C., which means within a working temperature which is still greater than the dew point of water. Feld has termed this the polythionate process.

The Polythionate Process

The original process for the recovery of ammonia from gas depends, as is well known, on the fact that sulphuric acid will react with the ammonia when the gas is led through a sulphuric acid bath, with the resulting formation of a finished product sulphate of ammonia. For the manufacture of one thousand kilograms of sulphate of ammonia there are are required in round numbers about one thousand kilograms of sulphuric acid, of 60 degrees Be.

But in the gas itself there are contained sulphur compounds which are of course derived from the sulphur that exists in the coal. The greater part of the latter sulphur that is found in the gases that are distilled from the coal is present in the form of sulphuretted hydrogen. There is sufficient of this compound in the gas to furnish the requisite amount of sulphuric acid, and in some cases more than this amount, to combine with all the ammonia recovered from the gas. The process which Feld developed had for its purpose the removal of the sulphur in the coal gas and coke oven gas and the utilization of this troublesome impurity for the manufacture of sulphate of ammonia. This was accomplished by the polythionate process.

Operation of the Process

Figure 1 is a diagrammatic sketch which shows how the process operates. The tarry ingredients of

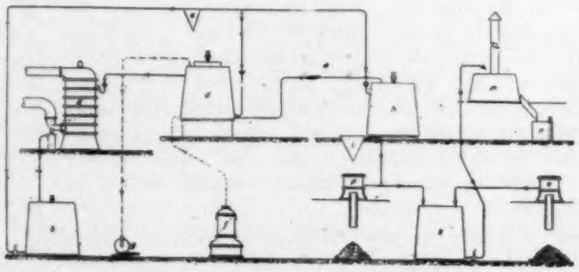


Fig. 1—The Polythionate Process

the gas have first been removed with the aid of a Feld washer or in some other suitable manner. Then the ammonia and sulphuretted hydrogen are washed out of the gas in a Feld washer, which is shown at a in the figure. This is accomplished with the aid of a wash liquor of special composition. This wash liquor is composed in such a manner that it has the power of simultaneously absorbing both ammonia and sulphuretted hydrogen. It is prepared from ammonia liquor, sulphur and sulphurous acid and it contains ammonium trithionate and ammonium tetrathionate, or as these salts are commonly called under a single name, ammonium polythionate. During the washing process the wash liquor absorbs ammonia and sulphuretted hydrogen from the gas, whereat the polythionate is converted into the thiosulphate and at the same time sulphur is precipitated.

Reactions in the Process

The reactions that take place in this process are as follows:

1. $(NH_4)_2S_3O_6 + 2NH_3 + H_2S = 2(NH_4)_2S_2O_3$
2. $(NH_4)_2S_4O_5 + 2NH_3 + H_2S = 2(NH_4)_2S_2O_3 + S.$

After the liquor has run out of the washer a it enters the tank b, from which the pump e lifts it into

(Continued on page 290)

GAS MERCHANDISING

Domestic – Industrial

Ideas for the Man Who Sells

William H. Matlack

THE WINDOW DISPLAY

"A GAS company's alertness is usually reflected in the kind of window displays they use to attract the public," Vulcan Bulletin.

Window displays call for as much thought as any other type of advertising and sometimes the production costs run much higher. Scenery as a rule for any stage costs money (even if the majority of the scenery is furnished by the manufacturer) and for that reason it should be cared for both before and after using. There will always come a time when cut-outs, drapes and special display material may be used again. Have a cupboard built to store this material, for even the special cut-outs will come in handy some day.

APPEAL

WE know a salesman who rarely fails to get a name on the dotted line, when husband and wife enter his store "to look at some gas ranges." This man says: "It's the easiest thing in the world to sell when a man accompanies his wife to our store to look at gas ranges. I simply appeal to his vanity; while looking at the wife I talk AT him, dwelling on the pride of possession and what other women are buying. He rarely will be outdone, and when I bring on my clincher about, 'of course, Mr. Smith wants you to have the best, Mrs. Smith,' he rarely fails to sign on the dotted line. After all is said and done I do not employ this method to oversell my customers, but to sell them what I truly think they should have."

A SOURCE OF PROSPECTS

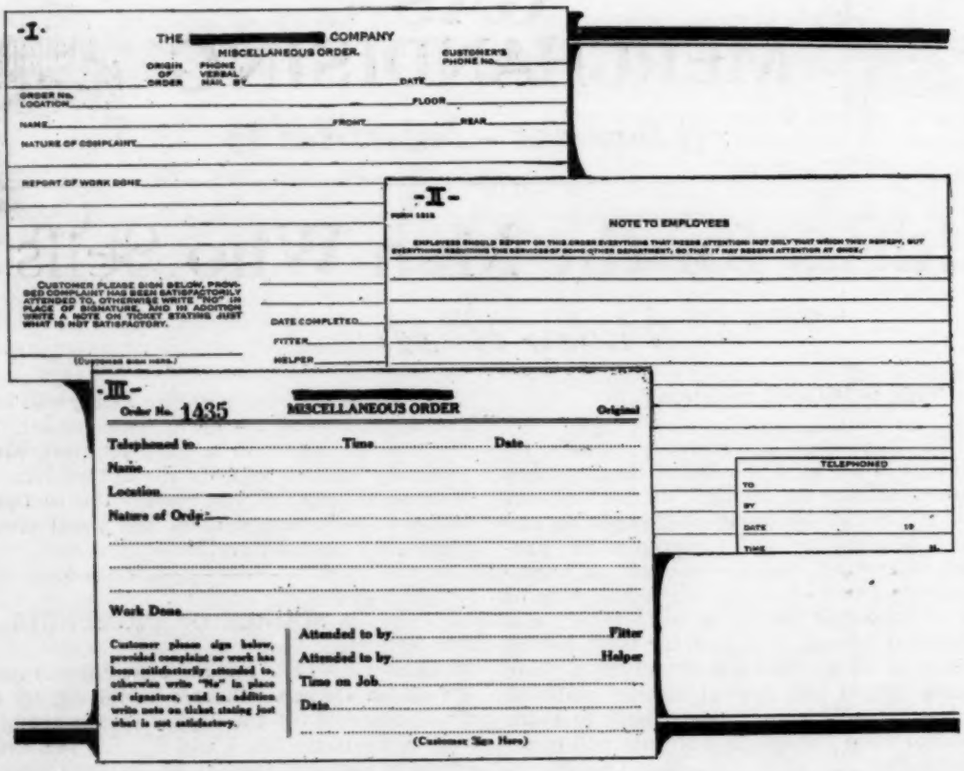
FREQUENTLY the sales manager says: "Gee, I wish I knew where I could dig up some live prospects for the boys. Things are pretty slow over in Districts No. 7 and 3." To this man we are going to suggest that if he has not consulted the service desk recently, he go there at once and get hold of the completed miscellaneous order file and look it over. The miscellaneous order file is the best source the gas man has to go to when in want of prospects. Just look at the way they come in: "Order No. 5087, dated Aug. 24, Mrs. Jim Brown, 2234 Highland Ave. Nature of order, gas range will not bake biscuits properly." Then we see: "Work done. Adjusted burners, needs new lining, old No. ..... range."

Then we pick "Order No. 5100, dated Aug. 25, Mrs. J. B. Smith, 2513 Megg St. Claims she cannot get enough hot water." Then under work done we note: "Old ..... cast iron type heater, has just installed additional bath; give it more gas."

Here, as you will see, are two live prospects. One indicates that Mrs. Jim Brown has an old style, badly-used gas range and is in the market for a new one, if properly approached, while the other indicates that Mrs. Smith is trying to furnish her family with hot water service with an antiquated contraption. Both can be sold, if they are told in the proper manner about the newer appliances.

If you do not use a miscellaneous order, get into the habit; it will save many misunderstandings and furnish you many, many live leads to pass out to your salesmen. We are submitting two forms of miscellaneous orders used by two different companies. One of them may be just what you need. Study them!

No. 1 is made out in duplicate. The original copy is sent to the shop and turned over to a service man for attention. The duplicate is held at the service desk until the shop turns in the original as

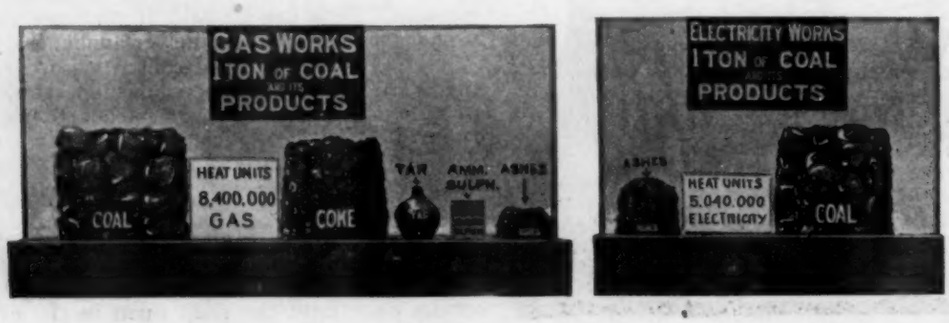


"completed," then the original is filed geographically, while the duplicate is destroyed. No. 2 is used only as original, sent to shop and returned by them to service department after work is completed.

Extracting the Energy from Coal*

As can be seen, while 1 ton of coal will produce 5,040,000 heat units (B.t.u.) in the form of electricity, the same amount of coal when carbonized will be responsible for 8,400,000 heat units of gas, and in addition large quantities of coke, tar, and ammonium sulphate. The actual heat units in the coke and tar were not given in the exhibit, but they can easily be computed by assuming that 9 cwt. of coke of calorific value of 11,500 B.t.u. per lb., and 10 gallons of tar of a calorific value of 18,500 B.t.u. per lb. result from the carbonization of 1 ton of coal. Taking these quantities, the heat in the products of carbonization becomes 8,400,000 (gas) + 112 × 9 × 11,500 (coke) + 10 × 10 × 18,500 (tar) = 21,842,000 B.t.u. When this figure is contrasted with the heat units in electricity—viz., 5,040,000— the moral is obvious

*From Gas Journal (London).



As The Journal Views It

PROGRESS

Self-analysis is a natural habit with most of us. We are all more or less prone to study ourselves and what we have accomplished. Every now and then we sit back and take stock. We often set aside certain specified dates on which we review what has been done up to that point and compare the results with what we have accomplished in the past. All of us are interested in knowing what progress we have made, what our achievements have been, compared not only with what we have accomplished in the past but also with what others have accomplished.

What pertains to the individual is also true of an enterprise, for any enterprise is based primarily on the personal element. Thus, we find very common practice for an individual business organization or an entire industry to set aside certain specified times whereat various members of that industry meet at a common place, there to discuss what has been done in the past, how this compares with what has been done in previous times, and also what should and must be done in the future in order that, whatever progress has been made, be continued.

Thus, within a very short time the American Gas Industry will meet in Atlantic City, will hold sessions of various sections where the members will listen to papers and reports indicating the progress that has been made in the various branches of the gas industry during the past year. It is altogether fitting and proper that such an analysis be made at least once a year, and that the industry allow time for carrying out this analysis in a meeting wherein all the different branches are fitly represented. This, after all, forms one of the most important functions of the Convention, for it is only at such a time, when gas men from all parts of the country come together at a common meeting place, that the views of different men and women working under different conditions and in localities far apart geographically, can be presented. It is there that an opportunity is presented them to learn of the experience of others and to come to some sort of an agreement as to the best plan to adopt in any particular undertaking.

However, the question that must necessarily be asked at this point is "What is meant by progress?" One man may compare his progress with another's by counting up how much worldly possessions he has acquired. This is rather a common method and the only one that the average individual understands. Another man, however, may feel his worldly possessions are not so important after all and that they do not represent what he may call progress. This he may consider rather the satisfaction that he has gotten out of his life in rendering valuable services to humanity. There are probably many different ways and units of measurement whereby the degree of progress is estimated.

Of course, the gas industry is no different from any other industry, or other human undertaking or enterprise. It must make money in order to exist. But it is also true that the money making phase is not so strongly emphasized in the gas industry as in many others. The amount of money an average gas company can make is pretty well regulated by the rates which it is allowed to charge for its product. There is a far more important indicator of progress in the gas field than the mere financial standing of the industry.

The more important matter is the manner in which the gas industry has fulfilled its duty to the public in rendering services and performing tasks that are not really within its province. Gas men can look back with a good deal of pride at the great development that has taken place in the gas business in the way of rendering better service to the gas customer. Today, it is possible to say without fear of contradiction that there scarcely exists an industry in which the customer is treated so well, as in the gas industry. Service is given far in excess, at times, of that for which the customer pays. The gas industry is glad to give this service, for it feels that this constitutes its real function in human society.

Thus, when we gas men analyze the progress that has been made during the past year, we can point in a spirit of proper gratification to the fact that gas today is rendering better service than ever before and that the plans that have been laid for the future indicate an ever-increasing desire to please in every way possible the community in which the gas company operates.

Selling Gas Appliances by Circularizing

Use of classified direct mail lists builds appliance business

Frank H. Williams

SHOULD the gas appliance department of the gas company use direct mail advertising in its efforts to push business?

If the appliance department does use direct mail advertising, should it lump all its prospects in one list or should it separate them into separate lists?

The answer to the first question is "Yes." Direct mail advertising should be used by the appliance department provided that its use results in additional business. If the appliance department uses direct mail advertising but finds that its use is not satisfactory in building business, then its use should be discarded or the methods employed should be entirely changed.

And quite frequently when the use of direct mail advertising is not effective in building business for the appliance department, the trouble lies not with the medium itself but with the method employed in applying it.

Direct Mail Advertising Highly Selective

Direct mail advertising, it should be remembered, is just about the only advertising medium in which the advertiser has the opportunity of picking and choosing the people who will receive his advertising matter. The user of direct mail advertising can send his advertising matter just where and when he wants it to go. So, evidently, it is also to the advertiser's advantage to combine with its selective character the additional punch of making the advertising matter apply specifically and definitely to the people getting it and to no one else.

In other words, to answer the second question which opens this article, the appliance department should NOT lump all its prospects in one list but should separate them into different lists according to their characteristics and needs. Then to each list should be sent only such advertising as applies specifically and definitely to those included in it.

Wealthy People With Children List

While it is true that all people, who have children, as a general rule want the best there is in the world for them, it is also true that comparatively few people have the money with which to satisfy their desires. It is evident, then, that all of the wealthy people of the city who have youngsters are particularly good prospects for the gas appliance department because there are so many appliances sold by the department which will help children to enjoy themselves, become healthier, etc. For instance, wealthy children would appreciate automatic heaters in garages which would enable them to have shower baths after tennis or after swimmmg without coming into the house and disturbing the household. And wealthy youngsters, who do a lot of entertaining, would appreciate all gas appliances making it easier to cook as this would make it easier for them to entertain.

Good Prospects

Consequently it would be to the advantage of the gas appliance department to circularize the wealthy parents of the city along these lines. And the names of wealthy parents could be obtained by getting the names and addresses of the members of the local women's clubs and men's noon lunch clubs, such as Rotary, Kiwanis, etc., and then checking off the names of the members who have young children.

It would be easy to get the names of such club members by simply getting the year books or the books of by-laws of the clubs. Most books of this sort contain the names and addresses of all members.

And, of course, in most cities all of the more prominent and wealthy people belong to such clubs and organizations so that a list of the members of such clubs would, in reality, be a fairly comprehensive list of the more wealthy people of the city.

List of Women Interested in Demonstrations

Some women like nothing better than to see demonstrations of household goods. Such women will stop all housework and make great efforts to attend demonstrations. And such women are, generally, very deeply impressed by the demonstrations they witness and are always more inclined to purchase the goods they have seen demonstrated than they are to purchase any other kinds of merchandise.

In view of this, then, it would be a splendid stunt for the appliance department to get the names and addresses of the women who attend such demonstrations that it stages from time to time and to put these names on a separate mailing list and then to circularize all of the women on this list whenever a new demonstration is staged or whenever a special sales drive is made on any of the goods which have already been demonstrated at the appliance department.

These names could be easily secured by getting all the women who attend demonstrations to sign their names and addresses on cards provided by the company for the purpose. Most people get real pleasure out of signing their names and addresses when there is no liability or obligation involved in doing so. There should, therefore, be no trouble in compiling these lists.

(Continued on page 295)

INDUSTRIAL GAS LESSONS

IF IT'S DONE WITH HEAT — YOU CAN DO IT BETTER WITH GAS

Lesson No. 90

Heat and Change of State

LATENT HEATS

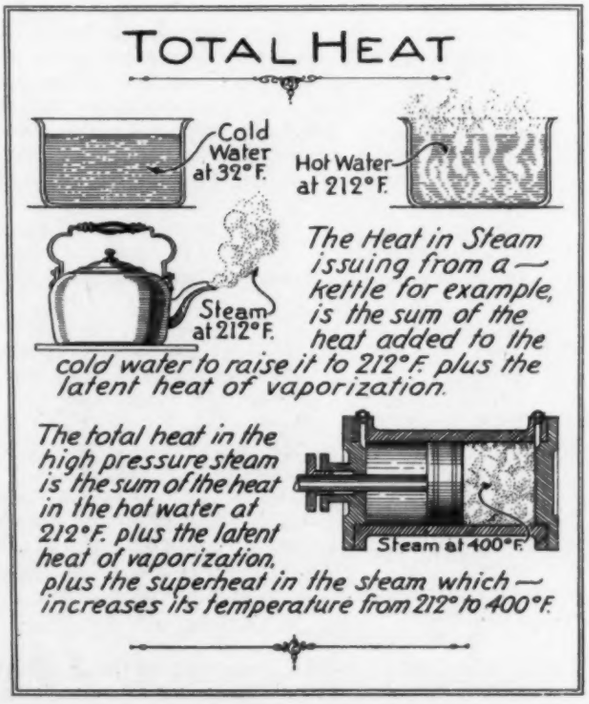
The figures in the aforementioned tabulation give the latent heat of various substances in calories per gram or calories per kilogram, or British thermal units per pound at the temperatures indicated. Whenever the temperature is not given, it is understood that the latent heat of the substance has been determined at the boiling temperature. It is, of course, possible to determine the latent heat of a substance at a point lower than the boiling temperature. The pressures at which the latent heats are determined are atmospheric. It makes a considerable difference in the value of the latent heat of a substance as to the temperature at which this property is determined. The pressure also affects the latent heat. Furthermore, due to the difficulty that is encountered in establishing this characteristic various values will be found for the latent heat of a substance, although the determinations may have all been carried out at the boiling temperature and under other comparable conditions. This is simply due to the errors made in the determination, the accuracy of the apparatus used in the determination, etc.

It will also be noted that water possesses the highest latent heat of all substances. The value given in the above tabulation is 964.6 British thermal units per pound. Another value used for this characteristic of water is 970.4 British thermal units per pound.

Total Heat in a Liquid

The total heat in a liquid is an important characteristic. It also applies to a vapor. At any temperature the total heat in a liquid is the heat that has been added to it to bring it from some basic temperature to the temperature in question. The total heat in a vapor, steam, for example, is taken as the heat that was consumed in heating the liquid from an initial and basic temperature of 32 degrees F. to the boiling point of the liquid, in this case 212 degrees F., plus the heat that was consumed in converting the liquid at the boiling point into steam and whatever heat has been added to the steam itself.

A very important table is built up on this basis and other bases as well, which table is known as the steam table, and from it are obtained the properties of the steam at different temperatures and pressures. A dry saturated steam will contain a certain amount of heat in accordance with the amount of superheat that is contained in it. The superheat is what causes the pressure of the steam to increase. The higher the pressure of the steam, the greater will be the heat contained in it and the total heat will always refer to the number of British thermal units that have been added to the liquid from an initial temperature of 32 degrees F. to a temperature of 212 degrees F., plus the heat of vaporization plus the superheat.


TOTAL HEAT
Cold Water at 32° F.
Hot Water at 212° F.
Steam at 212° F.
The Heat in Steam issuing from a — kettle for example, is the sum of the heat added to the cold water to raise it to 212° F. plus the latent heat of vaporization.
The total heat in the high pressure steam is the sum of the heat in the hot water at 212° F. plus the latent heat of vaporization, plus the superheat in the steam which — increases its temperature from 212° to 400° F.
Steam at 400° F.

Customer Ownership on the Pacific *

Report of the customer ownership committee of the P. C. G. A.

S. E. Skelley

Portland Gas & Coke Co.

THIS committee sent out questionnaires to the 68 member and non-member companies operating within the states comprising the Pacific Coast Division. Only 32 companies filed returns, of whom 13 reported "some activity in Customer Ownership," and 19 that "no securities have been sold under this plan."

The tabulation of returns on the first six questions presented by the questionnaire has been reduced to a percentage basis, as between all companies reporting and those that are engaged in some form of Customer Ownership activities with the following results:

	All Companies Reporting	Companies Engaged in Customer Ownership	Companies Not Engaged in Customer Ownership	Percentage Engaged in Customer Ownership
Population of territory served	7,311,316	6,805,616	505,700	93.8
Gross earnings	111,552,428	103,984,979	7,567,449	93.2
Number of customers	1,511,337	1,438,510	72,827	95.2
Number of stockholders	67,531	67,081	450	99.3
Number of shares outstanding	1,794,577	1,291,096	503,481	71.9
Number of employees	23,857	23,122	735	96.9

It will be seen that while these figures are based upon returns from only 13 companies engaged in Customer Ownership, the percentage of the totals of all companies represented by such companies exceeds 93 per cent, with the single exception of the number of shares outstanding. This item falls below the general average, probably for the reason that the figures on outstanding shares include both preferred and common, and a number of the companies that have not sold any shares under this plan have issued only common stock, and in large blocks closely held. This conclusion is supported by the fact that 99.3 per cent of all stockholders are shown to be in the companies operating under Customer Ownership.

Year	Preferred	Common	Other Securities
1916	1,440	none	none
1917	3,184	"	"
1918	2,094	"	"
1919	3,836	"	"
1920	49,228	"	"
1921	115,690	"	"
1922	194,377	28,972	859,500
1923	103,085	22,972	1,378,900
1924	131,552	71,751	356,100

*Read at the 1925 Convention of the Pacific Coast Gas & Electric Association.

Price of Securities Unimportant

The prices at which shares are sold by different companies, we believe, whether 50, 80, 92, 98 or 100, means little or nothing disassociated from the local situation which includes the past history of the company, its dividend record and rate, local conditions, etc. It would seem useless to quote here such figures except to say that on par value of $100, the prices reported range from $80 to $100. The rate of return at which the securities are sold has greater meaning and this factor has been commented upon herein.

Three companies reported that they do not pay commissions to employees or others on the sale of stock. The amount paid by the remaining companies varies from 50 cents to $3 per share, the average being approximately $1.50 per share. Only one company reports the sale of shares through brokers to whom a commission of $1 per share is paid. Several companies report commissions scaled per sale on the number of shares sold; two that employees receive $3 for the first share and 50c for each additional share on each sale.

Plans of Payment

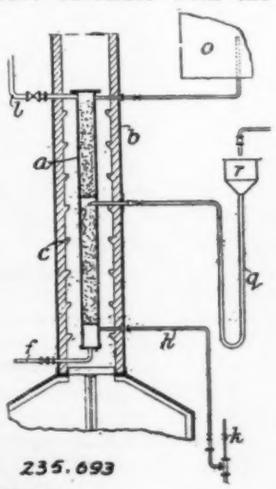
All companies sell shares on deferred payment plans, the principal difference in which seems to be in the amount of the initial payment, which is variously reported as $5, $7.50, $10 and $13. Subsequent payments are always a minimum of either $5 or $10 per share per month. In a few instances shares subscribed on time payments are issued immediately, the subscriber receiving the dividends and being charged interest on the deferred amount. Some companies credit on purchase price upon final payment, interest at the rate of 6 per cent on installments paid. Two companies report the payment of 6 per cent interest on such installments by check mailed to the subscriber on the regular dividend dates of the stock. This latter plan commends itself for the reason that the payment of interest immediately convinces the subscriber that his funds are actually at work for him and tends to lessen the inclination

(Continued on page 295)

PROGRESS IN GAS TECHNOLOGY
Domestic and Foreign

CARBURETTED WATER GAS

THE carburettor, a, containing packing material, such as broken silica ware, is placed in the off-take chimney, b, of a water gas generator. The chimney is lined with refractory material provided with projections, c. Gas oil passes continuously from the reservoir, r, into the carburettor, where it is vaporised and cracked, the vapor passing into the gas holder, o, until the pressure therein balances the head of oil in the reservoir, when the flow of oil ceases. This accumulation of pressure coincides with the blow period of the generator. During the run period the gas in the holder is drawn downwards through the carburettor and through the pipe, h, and is introduced into the generator together with steam through the steam injector, k. When the pressure has fallen sufficiently low, oil begins to flow again into the carburettor. If the carburettor becomes choked, air is blown upwards through the carburettor by means of the pipes, f, l, to burn out the carbonaceous deposit.—British Patent No. 235,693.



235.693

PRODUCING COMBUSTIBLE GASES AND COKE FROM BITUMINOUS FUEL

A MIXED coal gas and water gas, calorific value 390 B.t.u. per cu. ft., with a maximum yield of low temperature tar, ammonia, and coke, is produced in a three-stage process from bituminous fuel. In the hot blowing operation, the reactive semi-coke at the bottom of the generator is blown to incandescence, the gases formed being discharged at the center of the fuel column. After 1—1½ mins. steam is admitted and scavenging takes place until water gas emerges from the blow gas outlet. In the final or cold blowing process, the incandescent semi-coke is exposed to an ascending current of steam for 4 or 5 mins., the incandescent zone being kept stationary by withdrawing coke continuously from the bottom of the generator. The sensible heat of the water gas formed brings about partial distillation of the raw fuel charged at the top of the column, the mixed water gas and distillation products being withdrawn from the top. The thermal efficiency of the operation is 85 per cent.—British Patent No. 235,958.

DISTRIBUTION OF THE WATER OF DECOMPOSITION FORMED IN LOW-TEMPERATURE CARBONIZATION

COAL (10 kg.) was heated slowly in an experimental rotary retort to about 550 degrees and the yields of water, tar and gas determined at quarter-hour intervals. An eocene coal (Totis-er) and a lignitic coal (Teslic-er) were investigated, and the yields plotted against temperature. The moisture content had previously been determined by drying a sample at 105 degrees. The point at which the yield of water reached the value corresponding to this moisture content was considered as the commencement of the evolution of combined water. This occurred at 136 degrees for the Teslic-er coal, and at 170 degrees for the Totis-er coal. The subsequent evolution of the water of decomposition was almost regular except for maxima coinciding with the maxima of tar and gas evolution. A considerable quantity is given off before the evolution of tar commences. The question of the distribution of oxygen in the products is briefly discussed.—(Brennstoff-Chem., 1925, 6, 221-224.)

THE EFFECT OF ASH CONSTITUENTS ON COKE

THE influence of the ash constituents of the coal on the coking process may be considered under two main headings:

1—The effect of the amount of ash.
2—The effect of the composition of ash.

Ash in the coal acts as a dilutent and increases the amount of coal that must be carbonized in order to obtain certain yields of products. Then again ash has an effect on the mechanism of the carbonization process.

The disadvantages of ash in coke are serious for the coke user. Thus, for example, when coke is used in the blast furnace, the disadvantages are as follows:

1—Reduction of the fixed carbon in the fuel.
2—Necessity for using additional fuel and limestone for smelting.
3—Reduction of the hardness and resistance to abrasion in the coke with resulting increase in the proportion of the breeze.
4—Reduction of the available heat in the hearth.
5—Reduction of the reactivity of the coke which theoretically tends to increase the volume and reduce the temperature of its zone of combustion.

As far as the effect of the composition of the ash is concerned, certain inorganic compounds in the ash have a catalytic action on the carbonizing process. Iron salts, for example, increase the reactivity of the coke.

For further information the reader is referred to the original article published in the Journal of the Society of Chemical Industry, 1925, pages 345-350 T.

THE FELD PROCESS

(Continued from page 282)

the acidifier d. The liquor enters the acidifier through the distributor e, in which a portion of the sulphur slime sinks to the bottom. In the acidifier the liquor is treated with sulphurous acid which is formed by burning sulphur in the sulphur burner f. The pump g sucks the gases through the liquor in the acidifier.

The thiosulphate liquor is regenerated to form ammonium polythionate by the action of sulphurous acid and in this way it is rendered available once more for absorbing sulphuretted hydrogen and ammonia from the coal gas. The liquor returns to the washer and thus circulates constantly between the washer and the acidifier, with the result that it becomes increasingly concentrated.

When the liquor has sufficient concentration of these substances a part of it is removed from the acidifier and pumped into a digester h which is heated by means of a lead heating coil. There the heat converts the polythionates into ammonium sulphate, sulphur dioxide and sulphur.

The equations of the reactions taking place are as follows:

a. $(NH_4)_2S_2O_6 + (NH_4)_2SO_4 + SO_2 + S.$
b. $(NH_4)_2S_4O_6 + (NH_4)_2SO_4 + SO_2 + 2S.$

Further Operation of Process

The ammonium sulphate liquor is fed through the feeding device i where the sulphur is deposited and then reaches the tank k, from which it is removed by means of the pump l into the concentrator m. In this apparatus the solution is concentrated until the salt separates out. The salt is fed into the centrifugal machine o and dried there by centrifuging. The sulphur that is collected in the feeding device i is washed and also dried in the centrifugal machine and then is used in the process for the manufacture of sulphur dioxide gas or else it is sold on the market.

The polythionate process possesses an important advantage over the ammonia recovery processes which are used at the present time in that the fact that the reagents that are required for conversion of the ammonia into the important chemical and fertilizer sulphate of ammonia are all derived from the impurities that are contained in the gas. Sulphuric acid need not therefore be purchased.

Construction of the Feld Centrifugal Washer

The centrifugal washer which was devised by Feld is built on the basic principle that a current of gas comes into contact with a countercurrent of wash liquor. The gas enters at the lower end of the apparatus and rises in it while the wash liquor enters at the top, meeting the gas as it streams up. The wash liquid is atomized to the finest possible degree by means of a centrifugal device which is found in the washer. In this manner a series of liquor fogs or veils are formed within the apparatus which are continually added to by the vaporization of more wash liquor. The upward moving gas stream must pass through these fogs or mists and the result is that the two fluids come into very intimate contact with one another, and the gas is very thoroughly washed. The countless particles of liquid afford a surface contact of extraordinarily great area. Due to this the constituents in the gas which can be removed by washing are quickly absorbed by the wash liquor.

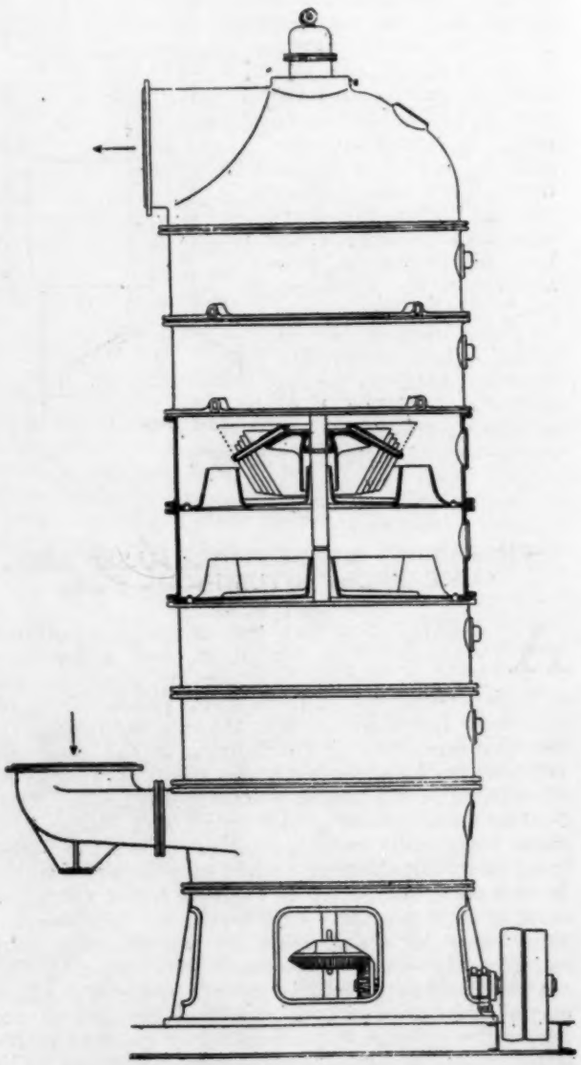


Fig. 2—The Centrifugal Washer

Further Details

The apparatus is shown in figure 2. The outer shell is made of cast iron and has a circular cross-section area. The diameter varies according to the load on the washer from 2 to 2.80 meters. The washer consists of a base, a gas inlet chamber which is provided with openings for the passage of gas, these being placed in a series one over the other and connected with one another in a suitable manner, and a number of washing chambers which are connected with each other and whose number depends on the size of the apparatus and its design. At the top there is an opening for the exit gases.

As shown in figure 2, there is also provided in the washer an atomizing device which is formed of a number of concentric wrought iron cones or funnels, the most external of which is provided with perforations in its upper part. All the atomizing devices are fastened to a single vertical shaft which passes through the washer, both of whose ends run in ball bearings. At the bottom of the shaft there is arranged a gear driving device, as is shown.

Operation of the Washer

The gas enters at the bottom of the washer, then rises through the openings in the bottom of the lowest washing chamber. The wash liquor is pumped into the tower at the top, and gradually falls down in the tower. The liquor finally collects in the bottom of the tower from where it is removed by a pump and recirculated over the top of the column.

When the shaft to which the centrifugal devices is set into motion, then centrifugal action causes the liquid to rise in the funnel-shaped atomizer with the result that it finally leaves the same through the fine openings in the most external of the funnels. In this manner it is very finely atomized and a fine mist of liquid is created within the interior of the apparatus. The mist collects around the internal walls of the washer and flows down through the openings that connect one washing chamber with the next, until it finally reaches the bottom of the tower, from which point it is removed by the pump.

One advantage of this type of washer is that there is very little resistance to the passage of the gas through it, so that a pressure of only twenty millimeters of water is required to drive through the washer a total of 240,000 cubic meters of gas in a twenty-four-hour period. For this reason it is quite feasible to connect a series of washers one right after the other in the installation. When this is done the pressure that exists against the passage of the gas is so small that it is not necessary to use a fan or blower of more than moderate size. The consumption of power is accordingly low.

Tests With the Polythionate Installation

The polythionate process is used in the Koenigsberg gas works and a test has been made to determine the effectiveness of the installation. At the outset all sorts of difficulties arose, which is quite common in the case of a new process, but all of these have been overcome and the technical details have all been worked out satisfactorily.

About one-third of the gas made in the works was treated in this process. The gas was first passed through a Feld washer and then through a Pelouze apparatus for the removal of its tar and water contents and then it was cooled down to a working temperature of approximately 30 degrees C. and treated according to the polythionate process. The first observation made with this process was that it resulted in a complete removal of the ammonia in the gas, an efficiency of 99.7 per cent being obtained. Furthermore, it was found that all of the ammonia could be obtained in the form of sulphate of ammonia without the need of using purchased sulphuric acid. There is far more sulphuretted hydrogen in the gas than is required to convert the ammonia into sulphate and the excess of the sulphuretted hydrogen is finally recovered in the form of fine yellow sulphur crystals.

Process Found to Be Practical

After a careful investigation was made it was concluded that the process is perfectly practical and can be used on a large scale in the gas works. The chemical reactions which appear to be somewhat complicated take place smoothly and no particularly special technical skill is required to obtain good results so that the process can be operated continuously and without danger of interruption from one source or another.

Description of Another Feld Installation

Another interesting Feld installation is seen in figure 3. The building in which this installation is

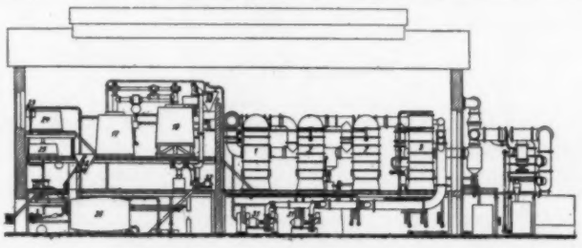


Fig. 3—The Zeche Stekrade Installation

contained is 46 meters wide by 17 meters long and 22 meters high. This building is divided into two rooms. The larger of the two rooms, the gas washing plant, contains in the upper story the washing apparatus and in the lower story the numerous pumps that are required for operating the installation. In addition there are in this room two electrically driven gas blowers for removing gas from the coke ovens and sending it through the entire purification installation. There are also two steam engines which operate the various pumps and apparatus in the purification installation.

The walls of the cast iron washers were covered

with wooden frames for protecting them against the action of the thionate liquors and the space between the two walls was filled with clay. The series of funnels which are contained in the washers and which are employed for atomizing the wash liquors are not made of wrought iron in this case but of wood which had been dipped in a solution of bakelite, and the steel shaft of the washer was provided with collars made of the same material. This was for the purpose of protecting the metal against the action of the acid liquors. The gas inlet was lined with fire resistant brick. The pumps that were employed in transporting the hot liquors were piston pumps in which all the parts were made of earthenware.

The Polythionate Installation

In the other room in this building there was contained the apparatus employed in the polythionate process proper. On the upper floor there were the various tanks, made from pitch pine wood, used in regeneration of the thiosulphate liquor as well as for the recovery of the ammonia sulphur and sulphur. There were also provided two centrifugal machines for the sulphate and another one for the sulphur as well as a turbo aspirator, which sucks the sulphur dioxide gas from the sulphur burners through the liquor. In this room there were also a number of pitch pine tanks for storing the various liquors during the process.

The sulphur burners were located outside of the building.

The method of working according to the Feld scheme is so thought out that the coke oven gas is sucked through the entire purification plant by means of the gas aspirator and thus passes through all the different washers in the series in which there is a gradual reduction of temperature.

Washing in Stages

Thus the washing of the gas is carried out in the following stages:

In Washer	Constituent to Be Removed from Gas	Working Temperature Degrees C.	Wash Liquor Used
1.	Pitch	160	Liquid pitch
2.	Steel works tar	130	Tar
3.	Heavy oil	100	Heavy oil
4 and 5.	Ammonia and sulphuretted hydrogen	80	Polythionate liquor
6.	Middle oil	30	Water
7 and 8.	Light oil (benzol and homologues)	18	Middle oil

This tabulation shows clearly the manner in which the gas is purified in the Feld process. The different liquids that are used for washing purposes are all prepared from the gas itself, that is, from the ingredients that are contained in the gas. This is with the exception of the water. The working temperature is controlled in the first two washers of the series by heating the wash liquor in pumps which are provided with steam jackets. The removal of the ammonia and hydrogenated sulphur in the two washers 4 and 5, which are connected in parallel, takes place at a temperature which is higher than the dew point of water, that is, over 73 degrees C. Hence a precipitation of the water contained in the gas and in this way the formation of large quantities of water that would have to be handled with the liquor, causing unnecessary dilution of the polythionate solution, is avoided. In washer 6 the gas is strongly cooled by direct washing with water and most of the water in the coke oven gas is accordingly removed. A mixture of water and oil is obtained in this washer and this mixture is pumped into tanks where the two fluids are allowed to separate, as one is heavier than the other. The middle oil that is obtained in this manner is employed as the washing liquor in the last two washers, 6 and 7, of the series. They serve to wash out the benzol and other similar substances that still remain in the coke oven gas. After the gas has passed through the last washer in the series, all the valuable and recoverable constituents contained in it have been removed and it can then be used in the heating of the coke ovens or may be employed as city gas, either as such or in admixture with other gas of higher thermal value.

Conclusion

(In the original article, which is of considerable length, there are given in great detail the results that were obtained in the observation of the practical operation of the Feld system of gas purification. These results are concerned with the degree of purification that is effected by the process and each washer was examined as if it were a separate unit in order to determine its effect on the impurities contained in the gases that passed through it. In this manner a very clear and detailed picture was obtained of the entire process and it was shown that each washer had a definite duty to perform in the installation, and by the proper control of operating conditions it was possible to make it fulfill its task, so that when the gas issued forth from the last washers in the series, all the ingredients that were of value and recoverable had been removed. It is not possible to give the details of this investigation here for lack of space, and the reader is referred to the original article in Das Gas und Wasserfach for them.—Editor.)

INDUSTRIAL GAS IN BALTIMORE INDUSTRIES

(Continued from Page 280)

design and construction of furnace, temperature regulation, furnace atmosphere and operation offers a field for study of methods to lower unit cost of products.

Cheap fuel is a thing of the past. Higher fuel costs increase the need for keeping pace with the best furnace practice. Fuels, furnace construction, etc., which are viewed reluctantly today may become a necessity tomorrow.

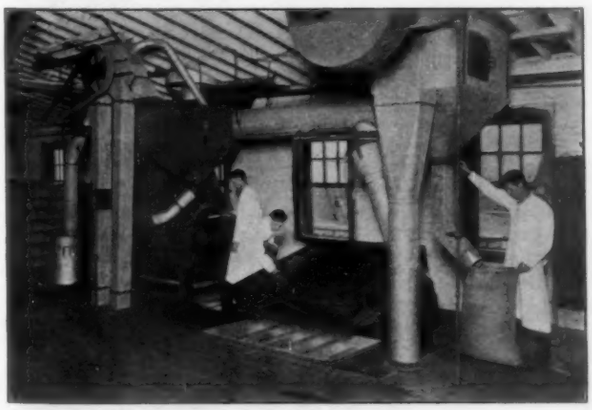
A gaseous fuel replacing a solid or liquid fuel cannot be efficiently applied by merely the substitution of a gas in the fire box or combustion chamber. A detailed study of furnace design and operation is required.

Enameling Sanitary Ware

A typical case of gas replacing coal is a plant in Baltimore, enameling sanitary ware. Coal was formerly used in this plant, firing a muffle furnace, in which the interior dimensions of the hearth were 8 ft. by 9 ft. 6 in. After making a detailed study of the coal operating conditions, it was decided that we could do away with the muffle and, in order to prove that the quality of the enamel ware would not be reduced, we conducted experiments in a small portable directly fired gas furnace under reducing, oxidizing and neutral atmospheric conditions. The experiments proved that our ideas were logical. Another important condition was the hearth area. We decided an 8 ft. by 6 ft. 6 in. hearth would be of sufficient size. The large interior was necessary with coal for heat reserve when the cold ware was placed in the furnace.

The furnace used 13 tons of coal per week, working 24 hours per day, six days a week and banked on Sunday. Assuming that there are 12,000 B.t.u. per pound of coal, then the total B.t.u. used per week was 312,000,000 B.t.u.

The gas fired furnace used 192,000 cubic feet of gas for six days' operation and 8,000 cubic feet for heating up on Sundays, making a total of 200,000 cubic feet per week or 100,000,000 B.t.u. Production was actually increased 42 per cent with the gas fired furnace. Therefore, the total B.t.u. per week on the basis of same amount of production as the coal furnace was 70,000,000 B.t.u.—in other words, 70,000,000 B.t.u. in the form of gas replaced 312,000,000 B.t.u. in the form of coal.



Roasting Coffee with Gas

Considerable Research Necessary

Considerable research work was done on this furnace and we worked out the heat balance which we believe is very accurate.

The enameling done by this plant is the dry process, each piece of ware is given a ground coat and one-half of the ware one coat of white, the other half is given two coats. Therefore, all ware is heated from 50 to 1600° F. Half of the ware reheated twice from 1000 to 1500° F. Half of the ware reheated once from 1000 to 1500° F. Over an operating period of two months, an average of 11,380 pounds of ware was enameled per 24 hours with an average gas consumption of 37,500 cubic feet. The heat balance is as follows:

	B.t.u.	
1—Heat put into ware	5,080,000	27.1%
2—Radiation loss	4,560,000	24.4
3—Loss in flue gases (due to heat put into ware and lost as radiation)	7,510,000	40.0
4—Door losses, etc.	1,600,000	8.5
Total	18,750,000	

The heat put into ware was calculated from the weight of iron heated.

The radiation loss was determined by actual test on the furnace when the furnace was idle. We determined the gas required to maintain a temperature of 1700° F. inside of furnace.

The loss in flue gas was calculated from the heat in the flue gas at 1700° F.

Smelting the Enamel

Gas also replaced coal for the smelting of the enamel. Here, again, we made radical changes in furnace construction.

An average of 241 pounds of coal or 2,892,000 B.t.u. were used to smelt a batch of enamel of 480 pounds. This was exclusive of the coal used to bring smelting up to the desired temperature.

Two thousand seven hundred cu. ft. of gas or 1,350,000 B.t.u. were used with gas—a ratio of over 2 to 1. Considering the fact that more time is required to bring furnace up to temperature and that we were also able to reduce the smelting time to two-thirds of the time required for coal firing, the labor cost per batch is considerably reduced. Another cost item is the furnace repairs, which are considerably less with gas than with coal. When all factors are considered, the resultant unit cost of operation in this plant is lower with gas than with coal.

Another installation recently converted to gas is

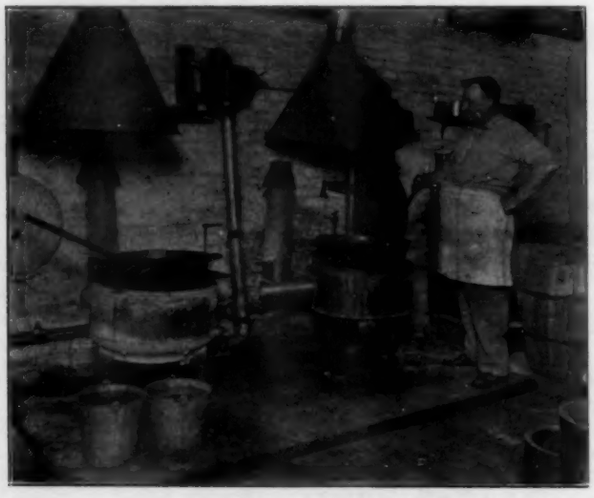
one replacing a producer plant. Pea coal was used as fuel and industrial gas actually equalled the bare cost of coal on a basis of $9 per ton.

The Porcelain Enamel & Mfg. Company, which has a model enameling plant in every respect, uses gas exclusively. Coal was the fuel used by this plant years ago. Gas replaced this fuel and after several years of operation oil was given a trial, but gas was selected as their fuel in the new plant. Gas was adopted to carry the industrial heating load at the Porcelain Enamel & Mfg. Company plant only after full consideration was given to all fuels. I do not believe there is any other industry which keeps a better record on factory costs, and their decision proves concisely that many factors enter into the fuel costs other than the basic fuel price.

Other Industrial Uses for Gas in Baltimore

In concluding, I wish to bring to your attention a few of the many other applications of gas in our industries of Baltimore.

Each edition of our daily newspaper could hardly be published except for that most versatile of all fuels—gas. A modern newspaper uses about ¼ cubic foot of gas for every copy of the paper published. In the office of the Baltimore Sun, thirteen distinct heating operations are constantly being carried on



Making Hard Candy with Gas

with gas, ranging all the way from the delicate heat required for drying fresh photographic plates to the terrific blast used to keep ten tons of stereotype metal in a molten state 24 hours per day every day of the year.

The News and American, Post, Afro-American, Daily Record, Jeffersonian and other daily and weekly periodicals likewise use gas for all heating operations practically to the exclusion of other fuels.

Coffee Roasting

Baltimore is quite a coffee roasting centre. Ninety-eight per cent of all coffee prepared in Baltimore is roasted with gas, the cost ranging from .005 to .01 cent per pound.

Every year millions of loaves of bread are baked with gas in Baltimore bakeries. The large bakeries use ovens that produce 2,200 loaves of bread per hour each. Every loaf is so perfectly baked that it is impossible to tell one from the other. Some of these ovens are one hundred feet long, the pans of dough being automatically fed into one end and the loaves discharged into conveyors at the other end so that no hand touches them throughout the whole process. It is interesting to note that during the past six months gas bake ovens have been installed in Baltimore of sufficient capacity to feed a city of 100,000 people.

Bread and cake baked in gas ovens stay fresh longer than when baked by any other means and the cost of operating gas ovens is less than operating any other type of oven, the fuel for each pound loaf costing only .006 cents.

Every hospital, institution, asylum and club in Baltimore prepares its meals exclusively with gas. Practically every restaurant and lunch room uses gas entirely for cooking and partial water heating, and all hotels except two do likewise and these two do a large part of their cooking on gas ranges.

The cost of cooking a $1 meal with gas is only 4 mills, hardly more than the salt and pepper costs.

Tin Can Manufacture

Hundreds of millions of tin cans are annually made in Baltimore factories. One company specializes on nothing but cans for condensed milk, shipping as far west as Seattle, Washington. Another factory ships carload after carload of soup cans. Other factories sell to independent canneries in many states. Although their products are used for many purposes, gas is essential to the operation of a modern can factory. The use of gas in can factories is now done so scientifically that the saving in solder alone nearly pays for all gas used. Besides applying heat directly in the manufacture of cans, gas is extensively used in the preparation of solder and great amounts of solder are recovered from otherwise worthless dross in immense gas furnaces.

The tin lithographing factories in Baltimore are leaders in the industry. Two of these plants are among the largest in the world, one having branches in 93 cities. Practically all industrial heating in all these factories consisting of lithographing ovens, heat treating furnaces and miscellaneous uses, is supplied by gas. The products vary from such quantity produced articles as tobacco cans to the highest grade candy boxes, true works of art. Hundreds of millions of cork lined tin bottle caps are made in Baltimore, the cost of gas heat for preparing the cork and decorating the tin being only the smallest fraction of a cent per 100 caps.

Gas in the Clothing Industry

The art of pressing clothes has been revolutionized in the last ten years. Quantity production and increased quality has been the cry. This has been met with the gas steam pressing machine of which there are probably 5,000 in use in Baltimore. This machine steams, sponges and presses a complete garment in a very few minutes and gives a superior press at a full cost of .006 for a press for which the tailor receives 50 or 60 cents.

A later development in the clothing industry is the gas steam hand iron. This is used for white goods in factories and steam from gas boilers flows through holes in the iron as it passes over the garment. Gas burners in the iron superheat the steam before it leaves the iron. The use of this invention has shown steady labor savings of from 25 to 50 per cent in the factories where it is in use.

Ice Cream Cones

Entire factories in Baltimore are devoted to the manufacture of ice cream cones. Automatic baking machines feed the batter into moulds which are heated with gas, the whole process requiring not over a minute. Gas, besides being the most flexible fuel available for this work, costs less than a cent per 1,000 cones.

Among the unusual uses of industrial gas is the smoking of meats and fish. By a clever combination of gas and certain kinds of sawdust, an unapproachable flavor is imparted to meats. The large packers in Chicago smoke entirely with gas and its use for such purposes in Baltimore is making rapid strides.

The list of products manufactured in Baltimore in which gas plays a vital part is practically unlimited. Besides factory uses, gas is universally used in the home for cooking, water heating and laundry purposes, truly one of the cheapest necessities of life.

A mammoth experiment has been going on in Baltimore during the last six years, during which time over 1,300 residences have been heated entirely with central gas heating plants. The value of elimination of dirt, dust, ashes and work and the substitution of a clean, uniform, healthful heat can hardly be calculated, and if this experiment is a success, we can shortly see the dawn of a day that vindicates the belief that

"If it's done with Heat, you can do it Better with Gas" in factory, shop and home.

SELLING GAS APPLIANCES BY CIRCULARIZING

(Continued from page 286)

List of Society Figures

There are always in most cities a certain comparatively limited number of people who are constantly getting into the society columns of the local papers because of the fact that they are giving parties, or observing anniversaries, or entertaining their clubs, or going on the trips or doing something or other of a social nature.

And, generally, these people are the folks who want the latest things in style, who play only the latest musical records on their player pianos or phonographs, who are up to all the latest quirks in radio and who take the greatest sort of pride in being just a little ahead of the other folks of the city.

In view of this fact, then, it would be good business for the appliance department to compile a list of these society folks from the society columns of the daily papers and then to circularize the list every now and then with letters calling attention to the newest STYLES among the appliances sold by the company.

Style always gets the attention of such people and so they would be much interested in whatever the appliance department had to say about the style of the appliances it was selling. And all this would make them anxious to keep in the forefront of the procession by purchasing the newest styles in gas appliances sold by the company. All of which would be a splendid thing for the gas appliance department's business.

List of New Home Buyers and Newcomers

Strange as it may seem, there are some appliance departments which do not circularize new gas customers of the company. All new gas users should, of course, be circularized at once with literature telling all about the appliances sold by the company and this should be done in addition to the personal calls made on such customers in trying to sell appliances to them.

Also, from the papers and from all other available sources, the appliance department should get the names and addresses of people who are putting up new homes or who are just moving into the city and should circularize them at once with letters congratulating them and urging them to buy gas appliances. These people are good prospects and letters will help sell them.

CUSTOMER OWNERSHIP ON THE PACIFIC COAST

(Continued from page 288)

to cancel his subscription at the first pinch of necessity.

There seems to be little uniformity in the details of the plans upon which employees are permitted to subscribe. The amount of initial payment varies from $5 to $13 per share and subsequent payments from $1.25 per month to $5 per month. In some instances interest is paid and credited on the subscription at 6 per cent. In several cases the em-

ployee receives as a credit towards his subscription dividends accruing during time of payment on shares subscribed.

Cancellations

The percentage of cancellations on partial payment sales is variously reported as follows: "Less than 1 per cent," 33, 25 and 20 per cent, "under 5 per cent, 24 and 5 per cent. Three report "none" and one "very few."

Concerning the terms under which subscriptions may be cancelled, five report that they refund the total amount paid plus interest (in three cases at 6 per cent; one 4 and one 3 per cent). One company refunds amount paid without interest; another amount less commission previously paid in the sale, and another upon terms "governed by circumstances in individual cases."

All of the companies engaged in Customer Ownership report the sales of shares through employees with the exception of one, where all stock sales are handled by officers of the company.

The percentage of the number of employees who actually make sales should be a matter of keenest interest to the companies engaged in, or contemplating Customer Ownership. The various companies report as follows: "None," 5, 10, 20, 28, 30, 3, 15 and 5 per cent. General average 12.8 per cent.

The percentage of employees owning stock varies as follows: 55, 80, 35, 60, 56, 50, 10, 10, 66, 25 and 20 per cent. General average 42 per cent.

Cost of Selling Stock

The approximate average cost of selling stock varies from "none" to $6 per share, but it should be explained that comparatively few companies furnished any data on this question. The committee does not feel that the figures quoted have any real value as the amount must necessarily vary widely because of local conditions. The elements of cost considered by those reporting were: Printing, advertising, payroll, traveling expenses, postage and telephone. The cost of advertising per share is variously given from "nothing at all" to $1 per share.

The following figures showing the average number of shares per sale made to the public are of especial interest: 3, 8, 13, 5, 6, 4½, 4, 24, 19, 8, 7, 13, 15, 17, 5. General average 10 3/13.

The average number of shares per sale to employees is reported as follows: 2, 4, 6, 2, 3, 3, 2, 3, 7, 13, 10, 11 and 6. General average 4 9/11. It would appear from the foregoing that some companies are not obtaining the wide distribution desired in the sale of their securities to customers, although the general average is as low as might be expected.

The Ten Cardinal Rules of Customer Ownership*

1. The sale of the securities must be direct from company to customer or through an agency expressly created for the purpose and controlled by the company.
2. The safety of the securities offered must be amply protected by property and earnings.
3. A minimum rate of dividends must be provided for insofar as honest judgment based on experience can foresee.
4. A reliable resale market must be maintained in some manner so that share holders who wish to dispose of their holdings can do so promptly at nominal expense.
5. A partial payment purchase plan must be operative in order to give every customer who can save a small amount monthly full opportunity to become a shareholder, and to encourage thrift.
6. The proprietary interest and responsibility of shareholders must be emphasized and the share holders supplied regularly with information regarding their company and its affairs.
7. Loss of capital by share holders is hazardous and fraudulent offerings from various sources must be guarded against by the rendering of authentic information and advice to share holders.
8. The number of share holders must be increased steadily and efforts should be made to avoid large individual accumulations of stock.
9. Employees must be carefully instructed in order that all representations made to customers or others are in line with the facts.
10. Managements must realize that Customer Ownership multiplies their obligations to the public and intensifies the trust reposed in them. It does not replace the constant striving for higher efficiency, good service, reasonable rates, courtesy and progressive public relations policies.

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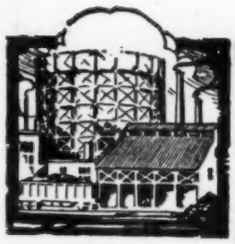
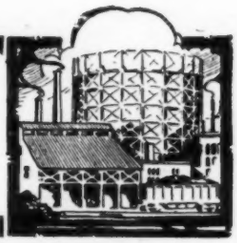
*Formulated by the Customer Ownership Committee of the N. E. L. A.

A Fine Example of a Window Display from Laclede Gas Co. of St. Louis



NEWS OF THE GAS INDUSTRY



The Citizens Gas Light Company

of Quincy, Mass.

Quincy has several husky industries which keep growing without very much being said about them. Less than 20 years ago the nucleus of the present gas company was struggling along with a force of about five men and 600 meters, serving only a limited section of the city. Today the Citizens Gas Light Company employs 100 people, had 16,288 meters the first of August and is installing them at the rate of 200 a month. It has 150 miles of mains and very few of the old mains are in the ground, having been taken out and larger ones installed. Years ago gas was used for lighting principally, but today 60 per cent is used for fuel. The last big job was relaying the main on Newport avenue, putting in an eight-inch main.

Installing new meters goes on daily, but the first of the month is when the big rush comes in changing meters for people who are moving. All these changes are wanted at once, for when a family goes to a new house the first thing wanted is some way of cooking the meals.

Mr. Quinn, vice-president, has a mass of statistics on gas at his tongue's end, but one of the most interesting statements was that Wollaston was not the only section of Quincy that is growing. He said: "You would be surprised how many new meters we are placing in all parts of the city. South Quincy, especially, is growing faster than you would think."

Mr. Quinn said that as a business proposition the Citizens Gas Light Company was quite an item on the city treasurer's books. Every 1,000 feet of gas sold in Quincy pays 15 cents into the tax collector's hands, so that the differences paid 20 years ago with 600 meters doing business against 16,000 now is some item to figure. As a coming fuel proposition gas has to be reckoned with. That, however, is another story that will keep.

Inhalator at Police Station

The gas company purchased an inhalator some time ago, and it is kept at the police station for use in case of persons overcome with gas. Very few times has it been used for anyone affected by illuminating or commercial gas, but it has been found useful for victims of the deadly auto gas, sewer gas and other cases where artificial respiration is needed. It is much more scientific than the pulmotor, working as near as possible on the plan of natural breathing and filling the human system with the very qualities needed to counteract any poisonous gas.

New Kinston Gas System

Kinston.—The local gas system will be shortly completed. Pipe lines have been laid in many parts of the city, and service was started months ago. Last mains will have been put down before cool weather. The system when completed will include twenty miles of mains, it is estimated. The Kinston Gas Company has invested between $100,000 and $200,000 here. The interests owning it have established headquarters in Kinston for many other holdings, including gas and electric business in several Middle Atlantic and Southern states.

Engineers of Public Service Company Are Entertained

Denver, Colo.—At the Colorado Motor Club, in beautiful Bear Creek Canon, 30 miles from Denver, 57 junior engineers of the Public Service Company of Colorado, with their wives and sweethearts, were honor guests at a dinner and dance given by Mr. and Mrs. Guy W. Faller.

Mr. Faller, the host, is vice-president of the company and head of its engineering training school.

Among the special guests were Mr. and Mrs. Clare N. Stannard, Mr. and Mrs. C. A. Semrad, Mr. and Mrs. H. T. Hughes, Mr. and Mrs. R. G. Gentry, Mr. and Mrs. F. R. Jamison, Mr and Mrs. J. M. Strike, Mr. and Mrs. C. F. Oehlmann, J. E. Loiseau and V. L. Board.

Eric G. Nelson is president of the school, Walter Howell vice-president and Benjamin Fuqua, secretary-treasurer.

A. B. Macbeth Elected to Vice-President, A. G. A.

A. B. Macbeth, executive vice-president of the Southern California Gas Company, was selected, at a meeting of the Executive Board of the American Gas Association on September 16, to fill the unexpired terms of Charles L. Holman as vice-president of the association. Mr. Holman resigned this office as well as that of president of the Laclede Gas Light Company in order to accept the presidency of the Georgian Manganese Corporation of New York. The nomination of Mr. Macbeth as vice-president of the A. G. A. for the coming year will be presented to the Convention at the first General Session on October 13.

New Bremen Gives Grant for Gas Lines

New Bremen—Having obtained a franchise from the village of New Bremen for laying gas mains and furnishing natural gas, the East Ohio Gas & Fuel Company has also contracted for the purchase of the gas mains which have been in some of the principal streets of New Bremen for almost four decades. The same company has obtained a franchise from the village of Minster, three miles south of here, and has put to work a gang of men digging trenches and laying mains.

How One Gas Co. Gives Service

Harrisburg, Pa.—"There is no reason why it should be! Gas engineering has devised ways and means of saving work in numerous ways for women who do their own cooking and housekeeping.

"We will be glad to show you that, by the proper use of equipment, your day's work can be cut down to an insignificant fraction of what is required with ordinary old-fashioned gas equipment, or coal heating and cooking apparatus. In the kitchen, in the laundry and in the furance room in the basement, we can show you how to lighten your burden. This information costs you nothing, and puts you under no obligation for the asking.

"Call us up on the telephone when you have special problems to meet," suggested an official of the Harrisburg Gas Company.

Gas Company Shows Its Appreciation

Denver, Colo. — E. Salisbury Smith, manager of the stock and bond department of the Public Service Company of Colorado, Denver, and R. L. Emrick, northern division manager, with E. M. Scanlon, J. T. Conners, A. R. Barke and E. W. Tollefson of Denver and V. R. Kinnison of Fort Collins, salesmen who have sold 2,000 or more shares of the company's stock within the past year, formed a merry party and have gone to see the big cities of the East, the company paying all expenses.

The "boys" will be the guests of Henry L. Doherty when they reach New York.

The total sales of the five mentioned go over the million dollar mark.

Gas Company Opens Service Branch

Fredonia, N. Y.—The Western New York Gas Company has opened a service branch in Fredonia. While various gas appliances will be offered for sale, the main object of the creation of the local branch is to educate the public to the economical and effective use of gas for all purposes, and to investigate complaints with a view to improving the service.

Mr. S. M. Kraeer, a courteous and competent young man, is in charge of the Fredonia branch.

Utilities Are Still Mysterious to Many

"The average citizen today still believes that there is something mysterious and unusual about the conduct of a public utility. While he knows that governmental bodies have made a failure of practically every business endeavor they have undertaken, and while he knows that the government could not run his business as well or as economically as he can himself, he still has a lurking idea that running a public utility is different, and that the city or the state or the national government might possibly be successful in that particular business," declares N. W. Brockett, Director of Public Relations of the Puget Sound Power & Light Company.

"This is one of the problems with which the average public utility is confronted. It can be solved only by taking the public into full confidence and by placing the facts before it. In the long run truth must prevail."

It is because of misunderstandings of this sort that public service companies have become increasingly large users of advertising space to tell the public the facts of their business, says Mr. Brockett. He maintains the plain statement of facts about the utility industry is both the duty of the utilities and a means of self-protection against the political demagogue and office-seeker who endeavors to win public support by unwarranted attacks upon the utilities of his community. The beginning of such advertising has been marked by increased public confidence in the utilities, and its continuation must result in the refusal by the public to give heed to unsubstantiated statements and abuse of the utilities that serve them.

A. & P. Gas Company Files New Rates

Palmyra, Pa. — The Annville and Palmyra Gas and Fuel Company, furnishing gas service in Annville Township, Borough of Palmyra, and adjacent territory, has filed with the Public Service Commission, to become effective October 1, 1925, a tariff which makes decreases, omissions and additions in existing rates:

Decreases—Decreases the rate for gas consumed from $2.50 to $1.55 net per M. cu. ft. for gas consumed over 500 and up to 3,500 cu. ft.; and for gas consumed up to 4,000 cu. ft., from $2.50 to $1.05 net per M. cu. ft.

Omissions — The maintenance charge heretofore in effect of 50c per meter per month has been omitted from the tariff.

Additions—Minimum bill: No bill rendered less than $1 per month. This minimum bill allows for consumption of gas up to 500 cu. ft. per month.

Rules and regulations — The rules and regulations have been clarified and three additional rules added.

Five Million Gas and Electric Installations in Empire State Now

More than five million gas and electric installations will be in service in the Empire State by October 1, says the New York State Committee on Public Utility Information.

Somewhere in the State this last week a mechanic for a public utility company finished the final tests of a gas or electric meter, wiped his hands on his trousers and went on his way to another hurry-up job. He had just completed the five-millionth installation — creating a record surpassing that of any other State or any geographical unit in the world having a population approximating New York State's—but it was only a part of the day's work to him.

"If we could figure out just which was the five millionth meter," declared M. S. Sloan, president of the Empire State Gas and Electric Association, "we'd have a celebration and mark it with a gold tablet. But we never can. It may have been in New York City, to measure the service to a huge industrial establishment.